

2003-05 Highway Operations Research



Public Reaction to Construction Related Traffic Congestion (\$50,000)

Traffic congestion produced by highway construction projects, and the resulting public reaction, are important issues. No guidelines exist to determine the appropriate strategies to address these areas. This project is intended to develop a predictive methodology to assist in development of appropriate public outreach and traffic mitigation measures for planned construction projects.



Improving Dual Loop Derived Truck and Speed Data (\$90,000)

Obtaining proper, real-time truck vehicle classification and speed data from the current dual-loop system is currently a problem. This research will identify loops in need of adjustment, determine necessary adjustments and develop a field manual for maintaining the dual-loop system. The result will be improved truck classification and speed data from the dual loop system.



Improving Video Derived Truck and Speed Data (\$90,000)

Currently, there is no method for obtaining accurate vehicle length data from the WSDOT video cameras. This data is needed to obtain improved, unbiased speed estimates. This project will develop software that will use the relative dimensions of vehicles in the traffic stream to filter out long vehicles on video images and calculate accurate, real time data inputs for the WSDOT speed estimation algorithm.



Freeway Flow Analysis Using Existing Data Archive (\$100,000)

This project will use the existing FLOW data archive and the CD Analyst toolset to investigate two specific issues of interest to WSDOT: 1) How much congestion on the Seattle freeway system is caused by incidents? and 2) What is the “optimum flow rate” for the freeway system and at what speed does that flow rate occur? Answers to these questions are central to understanding the operating environment experienced by WSDOT and for selecting ramp metering control strategies and incident response program parameters.



Short Term Prediction of Weather Elements and Impacts on Congestion/Incidents (\$130,000)

The potential now exists to determine the correlation between weather elements and congestion and to apply such knowledge to predict weather related congestion and incidents. This linkage of weather to traffic may be one of the only non-recurring congestion phenomena that can be accurately predicted. If the research is successful, it will provide a means for DOT personnel to prepare for imminent weather-related events.



WSDOT Arterial Signal System Data Collection Specification (\$30,000)

The regional arterial network consists of a decentralized collection of sub-networks governed by a number of entities with significant variability in data collection capabilities. In order to develop a useful arterial performance monitoring system, a consistent data collection protocol is required. This project will develop a preliminary arterial data collection specification to assist in addressing that goal.



Phase 3: AVL Equipped Vehicles as Speed Probes (\$125,000)

Past phases of this research have demonstrated in the laboratory it is possible to estimate travel speeds as well as construct travel times through corridors using existing transit vehicles equipped with automatic vehicle locators (AVL). These results could be used to augment the existing sensor network of loops, cameras and radar. This phase will incorporate these “virtual” sensors into the existing Transportation Management System real time database so they can be used by traffic management staff in the same way that loop data is used. The system will be updated to use GPS.



Phase 3: Continued Development of Congestion Prediction Models (\$75,000)

Under past research, a model is under development at the UW and is being tested with real roadway data from I5 and SR168. The scale is 15 miles downstream or 15 to 20 minutes ahead. The model can predict recurring congestion but needs to be expanded to model non-recurring incident created congestion and the dissipation of that congestion. Completion of a model that accurately predicts future congestion based on the physics of traffic will provide a foundation for real-time optimal control and a test bed for modeling roadway capacity changes such as lane closures and incidents.



Phase 3: Quantitative Use of Existing Video Equipment (\$150,000)

Past phases of this research have developed a proof of concept and a rough version of the software capable of producing speed estimates from existing video cameras. This phase will produce a working version and a report detailing the development of the algorithm and the steps necessary to go from the working version of the software to full deployment in the system.